# END TERM EXAMINATION

**FOURTH SEMESTER [BCA] MAY-2014**

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| **Paper Code: BCA-202** | **Subject: Mathematics-IV** |
| | **(2011 Onwards)** |
| **Time : 3 Hours** | **Maximum Marks: 75** |

**Note: Attempt any five question, including Q.no.1 which is compulsory. Select one question from each Unit. Scientific Calculator is allowed.**

Q1　(a) A fair die is tossed twice. Find the probability of getting a 4,5, or 6 on the first toss and a 1,2,3 or 4 on the second toss.

(b) Prove that:- $r\left({}^{n}C_{r}\right) = n\left[{}^{(n-1)}C_{r-1}\right]$.

(c) Evaluate $\Delta\left((e^{x}\,log2x)\right)$, where $\Delta$ is forward difference operator.

(d) A random variable x has the density function:-

$$f(x) = \frac{c}{x^2+1}, \text{ where, } -\infty < x < \infty.$$

Find the value of constant C?

(e) Find the probability of getting a total of 7 at least once in three tosses of a pair of fair dice.

(f) Find the moment generating function of a random variable x that is binomially distributed.

(g) Express $y = 2x^3 - 3x^2 + 3x - 10$ in factorial notation and hence show that $\nabla^3 y = 12$

(h) Prove with the usual notations, that
$\Delta^3 y_2 = \nabla^3 y_5$ where $\Delta$ is forward difference operator & $\nabla$ is backward difference operator.

(i) In how many ways can a committee of 5 people be chosen out of 9 people?

(j) Evaluate:- $\left(\frac{\Delta^2}{E}\right)x^3$, where $\Delta$ is forward difference operator. **(10x2.5=25)**

## Unit-I

Q2　(a) Urn I has 2 white and 3 black balls; Urn II has 4 white and 1 black balls; and Urn III has 3 white and 4 black balls. An Urn is selected at redom and a ball drawn at random is found to be white. Find the probability that Urn I was selected. **(6.5)**

(b) Find the binomial expansion of $\left(x + \frac{2}{x}\right)^9$. **(6)**

Q3　(a) The probability that a man will hit a target is $\frac{2}{3}$. If he shoots at the target until he hits it for the first time, find the probability that it will take him 5 shots to hit the target. **(6.5)**

(b) In how many ways can 7 people be seated at a round table if
(i) they can sit anywhere,
(ii) 2 particular people must not sit next to each other? **(6)**

## Unit-II

Q4　(a) A random variable x has density function given by:-

$$f(x) = \begin{cases} 2e^{-x} & x \geq 0 \\ 0 & x < 0 \end{cases}$$

Find:- (i) the moment generating function,
(ii) the first four moments about the origin. **(6)**

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(b) Find the expectation of the sum of points in tossing a pair of fair dice.(6.5)

Q5 (a) Out of 2000 families with 4 children each, how many would you expect to have (i) at least 1 boy (ii) 1 or 2 girls? (6)

(b) The mean weight of 500 male students at a certain college is 151 lb and the S.D. is 15 lb. Assuming that the weights are normally distributed, find how many students weigh (i) between 120 and 155 lb, (ii) more than 185 lb. (6.5)

## Unit-III

Q6 (a) Find the missing values in the following table:- (6)

| x: | 45 | 50 | 55 | 60 | 65 |
|----|----|----|----|----|----|
| y: | 3.0 | - | 2.0 | - | -2.4 |

(b) Using Newton's forward formula, find the value of f(1.6), if (6.5)

| x: | 1 | 1.4 | 1.8 | 2.2 |
|----|----|-----|-----|-----|
| y: | 3.49 | 4.82 | 5.96 | 6.5 |

Q7 (a) Find a real root of the equation $x^3 - 2x - 5 = 0$ by the method of false position correct up to three decimal places. (6)

(b) Find the root of the equation $x^3 - 2x - 5 = 0$ by Newton-Raphson method. (6.5)

## Unit-IV

Q8 (a) Apply Gauss-Elimination method to solve the equation:- (6)

$$x + 4y - z = -5$$
$$x + y - 6z = -12$$
$$3x - y - z = 4$$

(b) Apply Gauss-Serdal iteration method to solve the equations. (6.5)
$$20x + y - 2z = 17; 3x + 20y - z = -18; 2x - 3y + 20z = 25.$$

Q9 (a) Evaluate:- $\int_0^1 \frac{dx}{1+x^2}$ using Trapezoidal Rule by taking h = ¼. (6)

(b) Evaluate:- $\int_0^1 \frac{dx}{1+x}$ taking 7 ordinates by applying Simpson 1/3 Rule.(6.5)

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